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## Exploring socioeconomic concerns in Italian social media discourse on migration: A sentiment analysis of X posts

Social media platforms, particularly Twitter (now X), have transformed into significant arenas for public debate on immigration, showcasing a diverse spectrum of opinions and emotions. The current study utilized sentiment analysis, a method widely used in social media research, to delve into public sentiment in social network comments related to immigration, specifically focusing on Italy. The study compiled a dataset of X posts containing the keyword “immigrati” (immigrants) and conducted sentiment analysis to gauge the prevailing attitudes. The study aimed to uncover prevailing themes and connections in public discourse by identifying the most frequent topics. These patterns shed light on the primary topics and terms associated with immigration in Italy and their interrelationships. The findings contribute to a deeper understanding of sentiment and discourse surrounding immigration on social media, particularly within the Italian context. Results revealed the intricate and multifaceted nature of public opinion on immigration, with Italian concerns predominantly revolving around the irregular status of newcomers, the role of NGOs, and economic and safety issues, reflecting the complex nature of public opinion on immigration in contemporary digital spaces.

*Key words:* sentiment analysis, immigration, X; media opinions, Italy

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## Introduction

In the contemporary era of digital technology, anyone can expeditiously articulate their perspectives or participate in dialogues on diverse subjects through concise 280-character X posts (tweets) (Shrivatava et al., 2014). The rapid growth of social networks as an integral part of people's daily lives has piqued the interest of scholars, drawing attention to the profound societal impact of these platforms (Liccardi et al., 2007; Del Val et al., 2015). Social media (SM) platforms, which play a pivotal role in shaping public opinion, primarily act as spaces for discussions spanning various topics, with subjects like immigration, conflicts, and political dialogues frequently assuming central roles (Breiger, 2004; Ghosh et al., 2016). These platforms empower individuals to express their viewpoints in many fields (O'Connor, 2013). For instance, X is frequently flooded with discussions about migration, which often intertwine with other complex topics like religion, warfare, humanitarianism, and the work of nongovernmental organisations (NGOs, Babvey et al., 2019; Freire-Vidal & Graells-Garrido, 2019; Walsh, 2023; Żakowska & Domalewska, 2019).

According to the Eurobarometer (2022), many Europeans are positive about setting up social connections with immigrants. However, the report highlights that 68% of Europeans overestimate the actual percentage of immigrants in their respective populations. It underscores that 56% primarily obtain information about immigration through conventional mass media channels, while an additional 15% turn to SM. The current study aimed to perform sentiment analysis on comments posted on X within the framework of immigration in Italy. The examination spanned September 24 to October 19, 2023. Additionally, we investigated the associations between X posts regarding immigrants and those addressing potentially linked topics, such as invasion, illegal activities, and wars. Thus, the main research questions were:

- 1) Are the X post peaks related to such events?
- 2) What are the relevant emotions expressed in the X posts?
- 3) What are the main topics featured in the X posts?

The decision to focus the study on the Italian context was due to the complex situation of the Southern European country that is driving the public and political debate (de Rosa et al., 2021). More than 150,000 migrants arrived in Italy in 2023 in over 3,000 precarious boats (Integrazionemigranti, 2024). This situation further exacerbates the feelings of local residents, who are overwhelmed and, above all, isolated in managing this situation (Stocchiero, 2017). Therefore, it is essential to analyse the Italian context to shed light on what some scholars define as a European problem (Geddes et al., 2020).

## Media Roles of Narratives on Migration

The impact of SM on public discourse on migration is profound and multifaceted. SM platforms such as Twitter, Facebook, and Instagram allow users to sha-

re their experiences and opinions and assess their impact on immigration policy (Gintova, 2019). These platforms can provide voices that would otherwise remain unheard, intensifying and democratising dialogue (Longo & Shaffer, 2019) and opening the door to misinformation and xenophobic rhetoric (Lockett, 2021). Thus, the immediacy and reach of SM mean that an issue can move quickly, shape public opinion, and potentially influence policy decisions. Extensive academic literature has explored public opinion on migration through SM interactions. As Barisione et al. (2019) affirm, SM platforms, particularly X, have become significant arenas where citizens and political leaders express their views on immigrants and the migration process. This discourse often centers on three main issues: threat, humanitarian and financial aid, and opportunity, which shape public perception and response (Żakowska & Domalewska, 2019). In this context, SM is a tool for challenging established opinions and promoting reactionary change by allowing uncensored speech (King et al., 2013).

Several researchers are stressing analysis on SM platform posts. Walsh (2023) highlighted the prevalence of xenophobic content in X posts, especially among anti-immigration users. These users challenge mainstream discourse and promote exclusive worldviews, often focusing on national safety and identity, which reflect nativist ideologies. Such content raises concerns about X posts' potential to influence public attitudes and support for restrictive migration policies (Taki-kawa & Nagayoshi, 2017). Calderón et al. (2020) examined the discourse in Spain, identifying verbal rejection of foreigners as a proxy for hate speech. They noted a more empathetic discourse towards refugees compared to other immigrants. Nonetheless, concerns about safety, border control, and migration management escalate negative sentiments (Lori & Schilde, 2021). In this context, Dixon et al. (2018) reported that many Italians feel overwhelmed by refugees and unsupported by other countries or institutions, amplifying immigration-related tensions.

Thus, media framing plays a significant role in shaping public opinion about immigration. The way news outlets and influential figures frame immigration issues—whether as a crisis (Berry et al., 2016), an opportunity (Valenzuela-Vergara, 2019), or a threat (Farris & Silber Mohamed, 2018)—can influence public perception. SM platforms amplify these frames, often reinforcing existing biases. For example, the framing of immigrants as criminals or terrorists can provoke fear and hostility while framing them as hardworking contributors can foster empathy and support (Snider et al., 2023). Recognizing and challenging biased media framing is essential for promoting a more balanced and informed public discourse about migration (McCann et al., 2023). In addition to specific arguments about migration, SM serves as a powerful amplifier of global issues and movements related to immigration (Syed & Silva, 2023). Movements advocating for migrant rights, refugee assistance, and immigration reform often gain traction through SM platforms, such as X, campaigns, and viral content (Almeida, 2019). These platforms allow marginalized voices, grassroots activists, and humanitarian organizations to mobilise public support and challenge dominant narratives

about migration. SM's global reach and immediacy enable these movements to influence public opinion and policy agendas globally, highlighting the transformative potential of digital activism in shaping migration discourse (Hove, 2022).

Moreover, SM platforms serve as a powerful amplifier of global issues related to migration, influencing public opinion, policy agendas, and societal attitudes (Schneider & Reveilhac, 2023). They enable diverse voices to be heard, support grassroots activism, mobilize humanitarian responses, counter misinformation, and foster global solidarity. Thus, as SM continues to evolve, their role in shaping migration discourse and policies will remain significant, emphasizing the need for ethical engagement, factual accuracy, and inclusive dialogue to address the complex challenges facing migrants and refugees worldwide (de Rosa et al., 2021).

## **Data and Methodology**

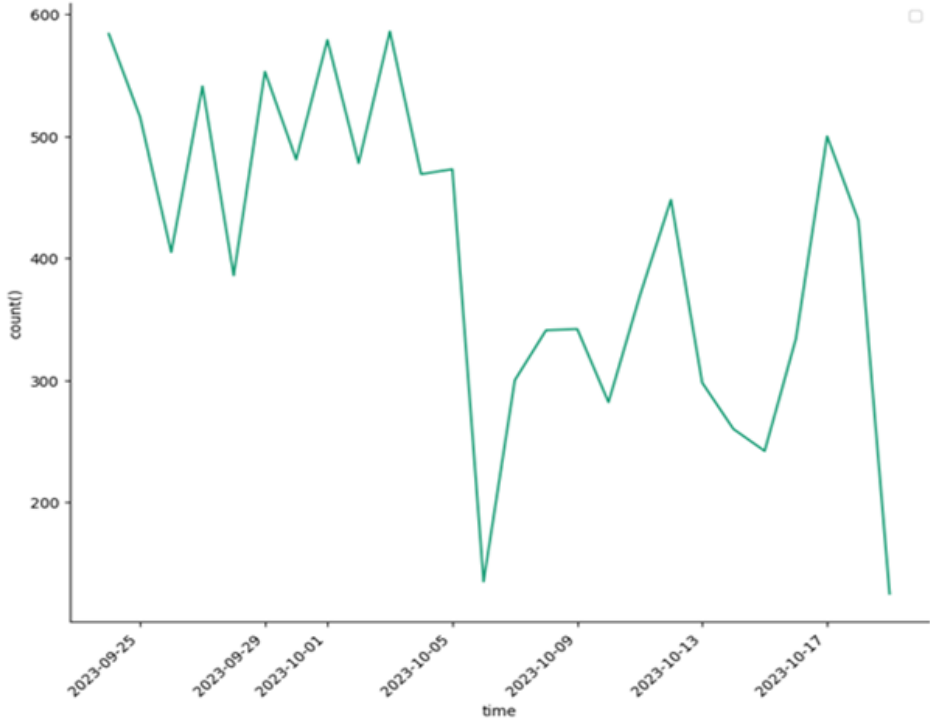
### **Data**

X posts were extracted using Apify (last access: October 2023), a free web scraping and automation platform. It provides tools and services for web scraping, data extraction, and automation of web-related tasks (Diouf et al., 2019). For this analysis, we extracted comments and statuses from X automatically using the keyword “immigrati” between the September 24 2023 and the October 19 2023, geolocated in Italy. The choice of these dates is related to the 10th Anniversary of the Lampedusa disaster on the 3rd of October 2023 (Zerback et al., 2020), where 368 migrants died. Thus, we could analyze if the peak of positive or negative sentiments is related to these events. A total of 10,406 comments and X posts were collected. The time trend is depicted in Figure 1, illustrating that most of these posts were published between September 24 and October 3. Notably, a significant portion of these X-posts was shared also on October 12, 2023. and on October 17, 2023.

### **Sentiment Analysis**

This section provides a comprehensive overview of the methodology adapted for sentiment analysis applied to a dataset of daily X posts with the keyword “immigrants” in the Italian context. The main aim is to delve into the sentiment conveyed within these X-posts and, subsequently, visualise trends in sentiment across the selected window time. Before delving into sentiment analysis, we thoroughly preprocessed the raw X post data to ensure uniformity and readiness for subsequent analysis. The preprocessing steps involved eliminating inconsistencies, such as X posts from flash news agencies, and promoting standardized text processing. Specifically, all text within the X posts was converted to lowercase to eliminate case-related influences on sentiment analysis.

Figure 1. Total X Posts



This study employed the Bidirectional Encoder Representations from Transformers (BERT) multilingual model (Wadud et al., 2023) to analyse sentiment in the context of sentiment analysis. Known for its efficacy in various natural multilanguage processing tasks (Özçift et al., 2021), BERT is often used to gauge sentiment in media articles (Jamil et al., 2022). The output of this analysis yields sentiment scores ranging from -2 to 2, where higher scores denote a more positive sentiment (Acheampong et al., 2021). To facilitate interpretation, we adopted a categorization scheme dividing the score range into three categories:

$$Sentiment_i = \begin{cases} Positive & \text{if } Sentiment\ Score_i > +0.5 \\ Negative & \text{if } Sentiment\ Score_i < -0.5 \\ Neutral & \text{otherwise} \end{cases}$$

### Latent Dirichlet Allocation (LDA)

Latent Dirichlet allocation (LDA) is a topic modelling technique to identify hidden themes within a collection of documents (Blei et al., 2003). As Negara et al. (2019) state, the LDA approach considers each X post as a mixture of various topics, where each topic is defined as a probability distribution over vocabulary terms. The assignment of each word to a specific topic is based on the probability

of the word concerning the available topics. In the current study, LDA operated on a set of  $X$  posts and a set of terms. The model assumes that the  $X$  posts are generated from a distribution of topics and that each topic is a distribution of words. LDA uses the Dirichlet distribution to model the distribution of topics in documents and the distribution of words in topics (Qomariyah et al., 2019). Let  $D$  be a corpus consisting of  $M$   $X$  posts, with  $X$  post  $d$  having  $N_d$  words. Words in  $X$  posts are observed variables, while  $\alpha, \beta$  are hyperparameters. The probability of the observed data  $D$  given a corpus is computed as follows:

$$p(D | \alpha, \beta) = \prod_{d=1}^M \int p(\theta_d | \alpha) \left( \prod_{n=1}^{N_d} \sum_{\delta_{dn}} p(z_{dn} | \theta_d) p(w_{dn} | z_{dn}, \beta) \right) d\theta_d$$

$\theta_d$  represents the topic distribution for  $X$  post  $d$ , sampled from a Dirichlet distribution with parameter  $\alpha$ ,  $z_{dn}$  represents the topic assignment for the  $n$ th word in  $X$  post  $d$ ,  $w_{dn}$  represents the  $n$ th word in  $X$  post  $d$ , and  $\beta$  represents the topic word distribution, sampled from a Dirichlet distribution (Jelodar et al., 2019). The LDA inference process begins with a random assignment of words to topics and refines this assignment based on the empirical statistics of the observed data, that is, the estimated probability of words concerning topics and the distribution of topics in the  $X$  posts. Thus, to implement LDA, it is necessary to remove stopwords and punctuation, and to lemmatize words and tokenize texts to create a list of significant tokens.

## Results

### Positive, Negative, and Neutral Score

Figure 2 provides an overview of the positive, negative, and neutral sentiment scores in the analyzed  $X$  posts. This information is essential for understanding the distribution and prevalence of sentiments in a specific context. Sentiment scores are assigned through careful implementation of the BERT model, and, as can be seen, most of them showed more negative emotions than positive ones. Overall, we identified 1889  $X$  posts associated with positive sentiments, representing 18.06% of the total. In contrast, the number of  $X$  posts expressing negative sentiments was significantly higher, reaching 7468, accounting for 71.06% of the total. This analysis reveals a clear predominance of negative sentiments in the text corpus, providing a detailed overview of opinions and the emotional climate regarding migrants.

Figure 3 illustrates the sentiment score over time, which tracks the daily evolution of sentiment on  $X$  posts about immigrants from September 24 to October 19, 2023. This type of analysis is valuable for identifying trends, fluctuations in emotional tone, or shifts in public opinion on a particular topic over time.

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Figure 2. *Positive, Negative, and Neutral Score Shares*

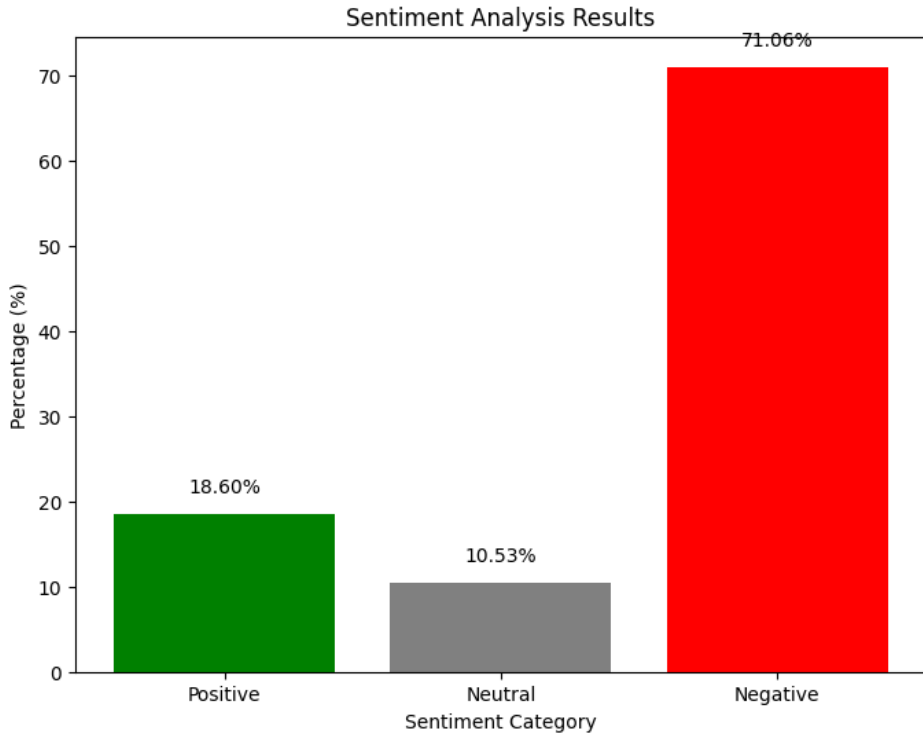
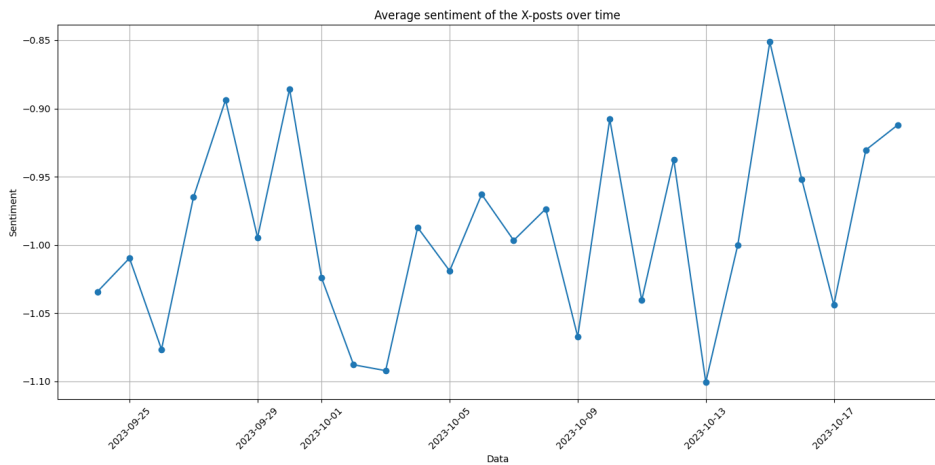


Figure 3. *Average Day Sentiment*

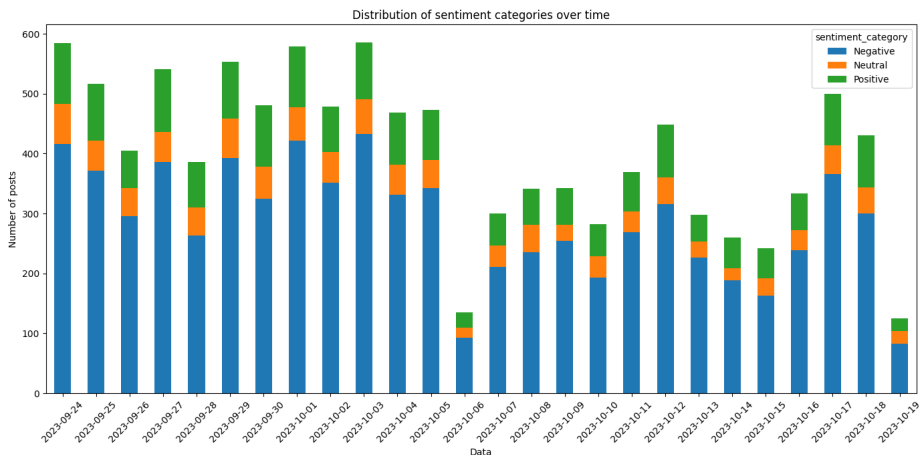


Sentiment scores range from negative to positive, with lower values typically indicating negative sentiment and higher values indicating positive sentiment. In our dataset, daily trends appeared relatively stationary. However, there were significant variations in sentiment scores, with specific days showing less negative sentiments than others. These trends were noticeable on specific dates such as September 28, September 30, October 10, October 15, and October 19.

In addition, analyzing the sentiment scores across the days from September 24 to October 19, 2023, Figure 4 shows the daily bar chart of negative, positive, and neutral results. Most of them are negative, we can see on which days the green bars that show the X posts with positive sentiment scores are relevant. For example, we can see peaks from September 27 to October 3. Two other peaks are recorded on October 12, and October 17 and 18. These results may be correlated with events. For example, from September 24 to October 4, the trend, although within a majority that expresses negative feelings, may be linked to events and demonstrations in memory of the 10th anniversary of the tragedy of migrants off the coast of Lampedusa.

Many studies also explore the emotions that can be identified for each analyzed text. For example, capturing only the positivity, negativity, or neutrality of X posts could be an understatement. It is also interesting to know if negative X posts, for example, convey anger, fear, hate, or disgust. We tried to adopt this approach, looking for basic emotions among positive, negative, and neutral Xposts, such as anger, disgust, fear, happiness, sadness, and surprise (Ekman, 1999). Unfortunately, this approach has not provided consistent results, as no emotional heterogeneity exists. The results showed that anger is the predominant and almost only emotion detected, followed in small percentages by fear and joy.

Figure 4. *Distribution of Sentiment Categories Over Time*





**Topic Patterns**

Word clouds work on the principle of word frequency. The more often a word appears in a text source, the larger and bolder it is displayed in the word cloud (see Figure 5). This visual representation is a quick snapshot, assessing whether a given text database is pertinent to meet specific information needs (Heimerl et al., 2014; Wu & Martín, 2022). The size of the words indicates their frequency in the analyzed X posts. Among other words associated with negative sentiments, we found "illegali" (illegals), "problema" (problem) "poveri" (poor), "colpa" (fault), "lavorare" (to work), "invasione" (invasion), and also "violenza" (violence), and "paura" (fear), reflecting fear and worries towards the influx of newcomers. There are also some positive terms, such as "accogliere" (welcoming), suggesting a sense of solidarity and recognition of the dignity of every individual, regardless of their place of origin.

The word cloud provides an overview of the most used terms, considering the entire dataset, regardless of time differences. For this reason, we extracted the timelines based on the terms most used in the posts in order to explore when the words showed the most significant relevance. The most commonly used terms were "clandestine" (irregular immigrants), with peaked on September 30 and October 11, "Italia" (Italy), with its peak on September 30, and "governo" (government), with peaks on September 30, October 6, and October 15. Among the most common terms, we found "Germania" (Germany), with greater frequency on September 30, "paese" (country), "ong" (NGO), with greater frequency

Figure 5. *Word Cloud*

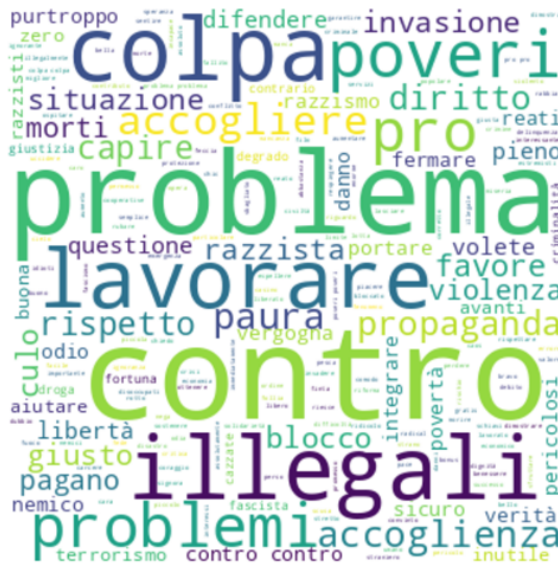
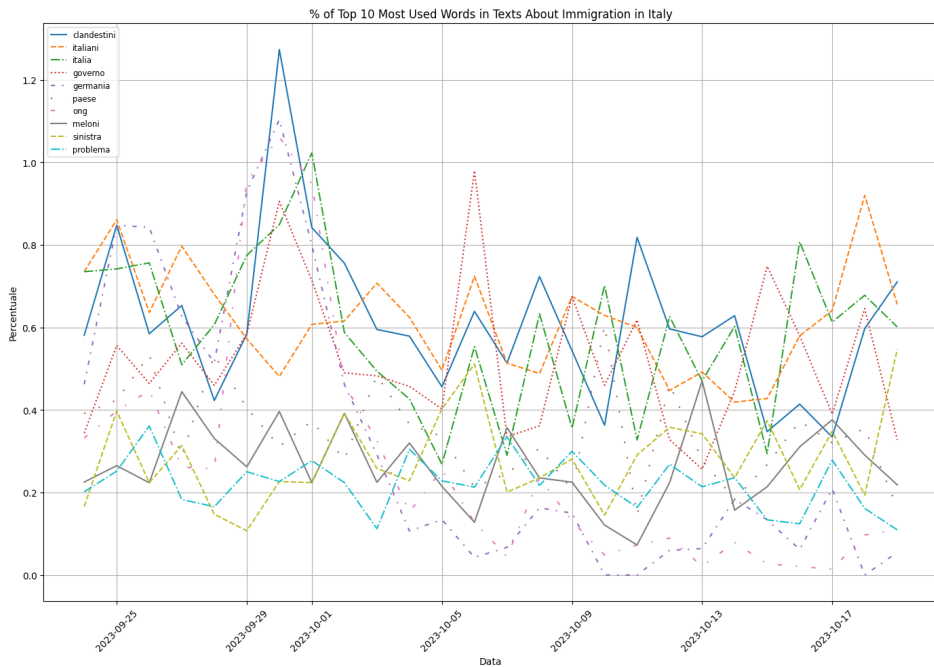


Figure 6. *Percentage of Top Words in X Posts*

on 30 September, "Meloni" (the Italian Prime Minister), "sinistra" (left, political orientation), and "problema" (problem). This graph is helpful because it helps understand if X posts are shaped not only by feelings but also by the front pages of newspapers or current political debates. Relations with the anniversary of the Lampedusa tragedy may be associated with the words "irregular immigrants" (Kushner, 2016) or with the intensive period of landings on the tiny Sicilian island. Another discernible pattern involves the terms "government," "Germany," and "NGO." During this period, media and newspapers extensively covered the German government's policies on immigration, highlighting both the restriction of immigration and the NGOs' funding in shifting migrants to Italian coasts (Öner & Cirino, 2023).

LDA provides a tool for visualising the similarity between topics in a two-dimensional space. Figure 7, shows the marginal distribution of the topics, which shows the percentage of each topic. In contrast, the estimated term frequency within the selected topic indicates the estimated frequency of the terms within the selected topic. The LDA analysis identified five distinct topics. The first graph represents the percentage of relevant terms for each topic. The first shows a relationship with economic issues, suggesting that immigration could threaten Italians concerning labour and financial stability, which is also aligned with the

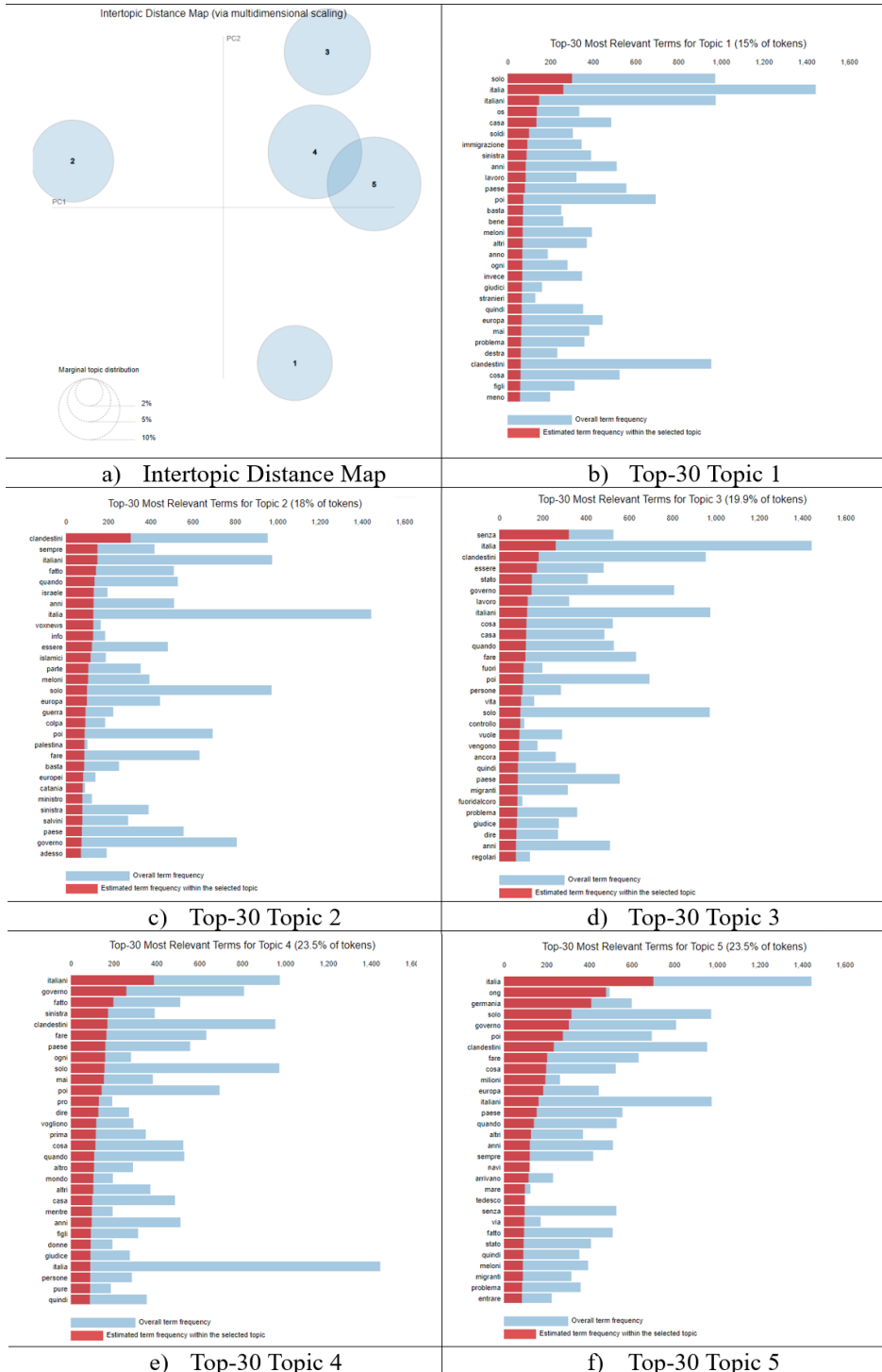
push-out theory of populism (Aubrey, 2020). Relevant terms include "soldi", 'lavoro' (work), "Meloni", "sinistra" (left), "clandestine" (irregular immigrants), "basta" (stop), "problema" (problem), and "Europa" (Europe), indicating a discontent regarding the management of immigration by the European Union, associated with landings on the Italian coast.

The second topic seems to refer to the Israeli-Palestinian conflict, with keywords such as "Guerra" (war), "Israele" (Israel), "Palestina" (Palestine), and "islamici" (Islamics). This topic may reflect how concerns and tensions in the Middle East could impact migration to Italy, fueling fears that terrorists might more easily reach European territories (Snider et al., 2023). The third topic mainly concerns the issue of borders, highlighted by the terms "clandestini" (irregular immigrants), "problema" (problem), "governo" (government), "controlli" (controls), and "regolari" (regular immigrants). The fourth topic, on the other hand, does not offer a clear picture because the terms used are very generic. However, it can be highlighted for the first time that political orientation could play a role in the Italian immigration discourse as "sinistra" (left orientation) is an essential word in the topic construction. Finally, the fifth topic confirms users' concerns about Germany funding NGO boats to rescue migrants and bring them to Italian shores (Beck, 2024). Associated terms include "Germania" (Germany), "ong" (NGO), "tedesco" (German) and "governo" (government). This analysis highlights the different facets of the discussions on immigration in Italy, underlining the economic, geopolitical, and security concerns related to the migratory phenomenon.

## Discussion

Based on our analyses, the word most frequently used by users in X posts published between September 24th and October 19th is "irregular immigrants." The sentiment towards irregular immigration in Italy is a complex and multifaceted issue that evokes a range of opinions and emotions from the public, politicians, and various stakeholders (Angelucci et al., 2021). The discussion on this topic encompasses economic, social, political, and humanitarian considerations, creating a nuanced panorama of opinions (Franchino, 2009). This can be explained by the fact that some individuals in civil society and political figures argue that irregular immigration negatively impacts public resources, from healthcare to education and social services (Doan et al., 2021). Moreover, according to Albert (2017), immigration, even legal, is perceived by natives as increasing competition for jobs and potentially contributing to economic challenges. On the other hand, according to Greco and Polli (2020), the political sentiment towards irregular immigration in Italy is diverse and can be influenced by political debates. For instance, speeches advocating for a more restrictive stance on undocumented immigrants, supporting stricter border controls and harsher immigration policies touch on the heart of concerns perceived regarding national safety threatened by immigrants (Bove et al., 2021; Román & Sagás, 2020; Rosales et al., 2021).

Figure 7. Topics Patterns - LDA



Furthermore, our results show that the other hot topic discourse on immigrants is around the perception of an "invasion" by immigrants in Italy, which is a highly charged and controversial topic, reflecting a complex interplay of social and political factors. Despite only about 8.5% of the population being foreign-born (Eurostat, 2022), a prevailing sentiment contributing to the perception of invasion is rooted in concerns about the significant number of immigrants entering the country by ship (Gabai, 2019). Another dimension of the discussion revolves around cultural and social changes. As in Indelicato and Martín (2024), the concern is that the increasing number of immigrants may pose challenges related to cultural integration and social cohesion, potentially overriding and threatening the country's cultures and traditions. Our analysis also found a strong association between the term "invasion." This correlation is contrasted by Pope Francis' encyclical "Fratelli Tutti" (Pope Francis, 2020), which delves into theological teachings and promotes principles of tolerance and acceptance, aligning with the biblical Good Samaritan narrative (Welch, 1999).

Another significant player in this debate is represented by NGOs that are involved in shifting immigrants to Italy. The actions of these NGOs, which are often centred around search and rescue operations in the Mediterranean Sea, have elicited both support and criticism, fostering a nuanced discussion (Smith, 2017). As in Gonzale Vega (2019), a prevalent sentiment is critical of the activities of these NGOs, driven by concerns related to safety, sovereignty, potential unintended consequences, and the legality of their rescue operations. Chun et al. (2020) argue that this perception stems from the belief that the presence of these NGOs might inadvertently incentivise irregular migration, as migrants may perceive an increased likelihood of rescue, potentially leading to riskier journeys. Some critics also voice skepticism about the transparency and accountability of these organisations, posing questions about their funding sources, operational practices, and overall impact on immigration dynamics (Chun et al., 2020; Öner & Cirino, 2023).

The increase in positive X posts identified by our analysis around the tenth anniversary of the Lampedusa tragedy suggests that SM plays a crucial role in addressing migration-related issues through short messages or viral content. According to Barisione et al. (2019), these practices on SM are a tool that can quickly spread awareness and mobilise many people to take action. They serve as powerful instruments for influencing local and national policies by exerting pressure on politicians and civil society, and increasing public awareness about migration issues (McCann et al., 2023). For example, during the anniversary period, the positive X posts likely highlighted initiatives to commemorate the victims while advocating for increased migrant rights and better humanitarian policies. Such campaigns draw attention to current challenges and stimulate support for substantial changes in how migration should be addressed both locally and nationally. Moreover, SM's ability to amplify voices and stories directly from affected communities contributes to a more inclusive public dialogue. By sharing personal

narratives and experiences, SM users can humanize the issues and challenge stereotypes and misconceptions about migrants.

## Conclusion

The main aim of this study was based on the analysis of opinions and attitudes of users on the social network platform X towards immigrants, considering X posts published between September 24 and October 19, 2023. To achieve this, a sentiment analysis was applied to understand whether peaks of positive or negative sentiments were posted about the tenth anniversary of the Lampedusa disaster on October 3, 2013. According to Del Val et al. (2015) and Kapidzic et al. (2019), this could suggest that events influence user discussions.

The results show a clear negative X post trend from Italian users during the selected time window. Despite a peak in posts around the 10th anniversary of the Lampedusa tragedy on October 3, the average trend of posts during that period conveys a negative sentiment. Given this stark imbalance between positive and negative sentiment, further emotional analysis did not yield encouraging results due to the substantial prevalence of anger. However, the analysis indicates that X posts revolve around five main topics, which can be related to economic threats, terrorist threats, the irregular status of migrants, the political immigration battle, and alleged political tensions in migrant management between the Italian and German governments.

This study contributes to existing literature but has significant limitations that future research should address (Calderón et al., 2020; Debrael et al., 2021; Falekas et al., 2012; Hüu, 2022; Sutkutė, 2023; Tomaselli & Sampugnaro, 2022; Vincenzo, 2019). Firstly, a limitation arises from the temporal scope of the data used for analysis, and it would be insightful to conduct a temporal comparison over multiple years. Examining how sentiments and trends have evolved provides deeper insights into public opinion dynamics. Secondly, the geographical context is currently confined to Italy. Future research could enhance the analysis by expanding to other countries, particularly those with significant migrant influxes in European ports such as Spain and Greece. Additionally, including Eastern border regions would offer a broader perspective on migrant sentiment and its implications. Furthermore, comparing these situations with contexts like Central and Northern Europe would be enriching. This comparative approach could highlight regional variations in public attitudes towards migration and illuminate the diverse factors influencing these perceptions.

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### **Conflict of Interest Disclosure**

The Authors report there are no competing interests to declare.

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### **Research Ethics Statement**

Not applicable.

### **Data Availability Statement**

Data will be shared upon reasonable request made to the corresponding author.

### **Authorship Details**

Alessandro Indelicato: research concept and design, collection and/or assembly of data, data analysis and interpretation, writing the article, critical revision of the article, final approval of the article. Juan Carlos Martín: research concept and design, collection and/or assembly of data, data analysis and interpretation, writing the article, critical revision of the article, final approval of the article. Rossella Maria Pia Di Rocco: writing the article, critical revision of the article, final approval of the article. Vincenzo Marinello: writing the article, critical revision of the article, final approval of the article.

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